

NON-PUBLIC?: N
ACCESSION #: 9302030037
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Limerick Generating Station, Unit 2 PAGE: 1 OF 04

DOCKET NUMBER: 05000353

TITLE: Reactor SCRAM and ESF actuations resulting from an Electrohydraulic Control system transient coincident with a Balance of Plant battery ground due to an indeterminate cause.

EVENT DATE: 01/03/93 LER #: 93-001-00 REPORT DATE: 01/25/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 069

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: G. J. Madsen, Regulatory Engineer, TELEPHONE: (215) 327-1200
Limerick Generating Station

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On January 3, 1993, the Unit 2 reactor shut down automatically on high pressure after a transient in the Electrohydraulic Control (EHC) system occurred coincident with a Balance of Plant (BOP) battery ground alarm. Following the reactor SCRAM, reactor water level momentarily decreased to -37.9 inches causing the Reactor Core Isolation Cooling (RCIC) system to initiate, various Primary Containment and Reactor Vessel Isolation-Control System (PCRVICES) isolations to occur, and a Reactor Enclosure Secondary Containment isolation. These are Engineered Safety Feature (ESF) actuations. The reactor shut down on high pressure as designed, and all control rods fully inserted. The RCIC system initiated but did not inject since the signal was not present long enough to have other injection valve 'open' permissives satisfied. The ESF actuations

functioned as designed and the affected systems were expeditiously restored, thereby preventing any adverse impact on other plant systems. Following recovery from the SCRAM, Unit 2 entered Operational Condition 2 (Startup) on January 6, 1993, at 2307 hours. The cause of the EHC system transient and coincident BOP battery ground could not be established. While the unit was in operation, monitoring equipment was installed on the EHC system to provide information if a similar transient occurred. Tests on the EHC and BOP battery systems are currently being performed during the Unit 2 Refueling Outage, which began on January 23, 1993, and any related problems identified will be corrected during this outage.

END OF ABSTRACT

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Unit Conditions Prior to the Event:

Unit 2 Reactor was in Operational Condition (OPCON) 1 (Power Operation) operating at 68.9% power level in end-of-cycle coastdown.

There were no structures, systems, or components out of service that contributed to this event.

Description of the Event:

On January 3, 1993, at 1612 hours, the Balance of Plant (BOP) battery (EIIS:EI) ground alarm annunciated in the Main Control Room (MCR) and coincidentally all Main Turbine (EIIS:TRB) control valves cycled closed and subsequently reopened. The Main Turbine bypass valves cycled open and closed to maintain the reactor pressure at the Electrohydraulic Control (EHC) system (EIIS:TG) pressure setpoint in response to the control valve movements. The reactor shut down (SCRAM) automatically on high reactor pressure (1037 psig) during the Main Turbine control valve closure, since the subject bypass valves could not divert adequate steam volume to maintain reactor pressure below the trip setpoint. Immediately following the reactor SCRAM, reactor water level momentarily decreased to -37.9 inches (the zero reference point being 161 inches above the top of the active fuel) causing the Reactor Core Isolation Cooling (RCIC) (EIIS:BN) system to initiate, and various Primary Containment and Reactor Vessel Isolation Control System (PCRVICES) (EIIS:JM) isolations, Engineered Safety Features (ESF), to occur. The PCRVICES actuations resulted in partial isolations of the following Unit 2 systems:

- o Residual Heat Removal (RHR) (EIIS:BO) Heat Exchanger Sample and Drain Lines,

- o RHR Heat Exchanger Vacuum Breaker Lines,
- o Primary Containment Purge Supply and Exhaust Lines,
- o Primary Containment Exhaust to Reactor Enclosure Equipment Compartment Exhaust and Nitrogen Block Lines,
- o Primary Containment Sampling and Recombiner Lines, and
- o Miscellaneous Process Lines.

The following ESFs also initiated as designed due to the PCRVICS actuations. The Reactor Enclosure (RE) Heating, Ventilation and Air Conditioning (HVAC) system isolated. The 'A' trains of the Standby Gas Treatment Systems (SGTS) (EHS:BM), a common plant system, and the Unit 2 Reactor Enclosure Recirculation System (RERS) (EHS:VA), automatically initiated thus completing the RE Secondary Containment isolation.

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The Transient Response Implementation Plan (TRIP) procedures T-101, "RPV Control," and T-99, "Post SCRAM Restoration," were then executed by MCR personnel following the reactor SCRAM. The reactor shut down was accomplished with no abnormalities. All control rods fully inserted following the reactor shut down. General Plant (GP) procedure GP-3, "Normal Plant Shut down," was executed to continue with normal shut down activities, and procedure GP-8, "Primary and Secondary Containment Isolation Verification and Reset," was executed to reset the PCRVICS and the RE Secondary Containment isolations. Following recovery from the SCRAM and a review of the event, Unit 2 entered OPCI 2 (Startup) on January 6, 1993" at 2307 hours.

A four hour notification was made to the NRC at 2002 hours, on January 3, 1993, in accordance with the requirements of 10CFR50.72(b)(2)(ii), since this event resulted in automatic actuations of the RPS and ESFS. This LER is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(iv).

Analysis of the Event:

The reactor shut down automatically on high pressure as designed, and all control rods fully inserted. MCR Operations personnel successfully controlled the plant shut down using the appropriate Plant procedures. No Main Steam Relief Valves lifted, and no Emergency Core Cooling Systems injected into the reactor vessel as a result of the event. The RCIC system initiated but did not inject since the reactor low level signal

(i.e., A and B channels) was not present long enough to have other injection valve 'open' permissives satisfied. If a valid initiation signal occurred during this event, the initiation signal would have existed long enough for the RCIC system to perform its intended safety function. The various PCRVICS isolations also functioned as designed in response to the reactor low level signal. The PCRVICS isolations were reset in accordance with procedure GP-8 and the affected systems were expeditiously restored by operators, thereby preventing any adverse impact on other plant systems. The instrumentation level spike experienced during this event was consistent with previous testing on both Units 1 and 2, and all instrumentation responded as designed. There was no release of radioactive Materials to the environment as a result of this event.

Cause of the Event:

The cause of the high reactor pressure condition and the resultant reactor SCRAM was due to a transient in the EHC system. The cause of the EHC system transient could not be established. The cause of the concurrent BOP battery ground and any relationship to the EHC system transient could not be determined. The BOP battery ground alarm was immediately reset by Operations personnel after its annunciation, and did not recur. A review of the Plant Monitoring System (PMS) (EHS:ID) computer revealed that the battery ground existed for approximately 8 seconds. During this 8 second time period, data inputs were lost from plant equipment which have electrical power supplied from the BOP battery system.

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Therefore, determining the cause of this event was adversely affected due to the loss of the PMS information for the plant equipment which lost electrical power.

Extensive troubleshooting and testing of the EHC and BOP battery systems was performed by Philadelphia Electric Company and General Electric Company engineers, and no equipment abnormalities could be identified. The event could not be re-created by throttling open the Main Turbine control valves while manually agitating wires the EHC system control logic wiring. Security access computer printouts were utilized to determine if any plant activities could have contributed to the event, but no related activities could be identified.

Corrective Actions:

The cause of this event is indeterminate. No long term corrective

actions will be implemented, however, while the unit was in operation, monitoring equipment was installed on the EHC system to provide information if a similar transient occurred concurrent with the loss of the PMS computer information.

In addition, tests on the EHC and BOP battery systems are currently being performed during the Unit 2 Refueling Outage, which began on January 23, 1993. One particular test that was performed involved the utilization of an EHC system simulator which tested the pressure, load, and speed 'control' subsystems of the EHC system. The tests concluded that no problems exist with the various EHC subsystems, and that no electrical equipment supplied by the BOP battery ground system could have affected the EHC system control logic. More tests are scheduled for the EHC and the BOP battery systems during the current refueling outage. Any related problems identified during the performance of these tests will be corrected during this outage.

Previous Similar Occurrences:

No previous reactor SCRAMs resulting from an indeterminate BOP battery ground and a concurrent EHC system transient have occurred on either unit at Limerick Generating Station.

ATTACHMENT 1 TO 9302030037 PAGE 1 OF 1

10 CFR 50.73

PHILADELPHIA ELECTRIC COMPANY

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J. DOERING, JR. January 28, 1993
PLANT MANAGER
LIMERICK GENERATING STATION Docket No. 50-353
License No. NPF-85

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 2

This LER concerns a Unit 2 automatic Reactor Protection System actuation (a reactor high pressure SCRAM) and various Engineered Safety Feature actuations (Primary Containment and Reactor Vessel Isolation Control System isolations, and a Reactor Enclosure Secondary Containment isolation), resulting from a transient in the Electrohydraulic Control (EHC) system coincident with a Balance of Plant (BOP) battery ground. The cause of the EHC system transient and the BOP battery ground is indeterminate.

Reference: Docket No. 50-353
Report Number: 2-93-001
Revision Number: 00
Event Date: January 3, 1993
Report Date: January 28, 1993
Facility: Limerick Generating Station
P.O. Box 2300, Sanatoga, PA 19464-2300

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(iv).

Very truly yours,

DMS:cah

cc: T. T. Martin, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

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